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Public Health Services in British Columbia during the Floods of 1948

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NINETEEN HUNDRED AND FORTY-EIGHT will long be remembered in British Columbia as the year of the great flood. Not since 1894 had flooding been so severe and so general in the Province. Commencing late in May and extending through June and July, and in some cases even longer, most of the rivers, streams, and lakes in the Province were in flood stage. Although this report will deal primarily with the activities of the Health Department in the Fraser Valley, some mention should first be made of the flooding in other parts of the Province.

Northern British Columbia

In Northern British Columbia there was no report of serious damage on the great rivers such as the Liard and the Peace, simply because there is very little habitation on these rivers. The Skeena River, which drains an area of about 20,000 square miles, did cause some flood damage to towns such as Hazelton, Terrace and Usk. In each case the local health services took steps to combat the public health hazard involved.

Columbia Basin

The first reports of flooding came from the Columbia basin. The Columbia drains an area of about 40,000 square miles in British Columbia, and includes the areas drained by the Kootenay, Kettle, Okanagan, and Similkameen drain-

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age systems. Kimberley, Creston, Trail, Grand Forks, Kelowna, Hedley, Keremeos, and Princeton were among the communities in the Columbia basin that suffered damage from the flood. At the year's end there was still high water in the Okanagan Valley. In each area the local health services, which had been supplied with considerable advisory material from the Provincial Health Department, threw themselves whole-heartedly into the fight against the hazards of flood-borne disease. The same general plan of health protection by the local health service as is described in detail in this paper for the Fraser Valley was utlized in the other parts of the province affected by floods.

The Fraser

By far the most important area flooded from the point of view of economic loss and public health hazard was the lower Fraser Valley. This valley extends from the Village of Hope down-stream to the Fraser Delta, where the river discharges into the Gulf of Georgia, a distance of about 80 miles. The width of the agricultural part of the lower Fraser Valley varies from a few yards to about 15 miles. The agricultural lands are a series of flood-plains broken up by small ridges and protected from the usual flood stages of the river by some 200 miles of dykes. Some of the area is actually reclaimed marsh or lake bottom land, with an elevation lower than that of the normal state of the river.

The river is 785 miles long, rising in a small lake in the Rockies, sweeping by a great bend north and westward roughly north of and parallel to the Big Bend of the Columbia River, dropping south through the clay canyons of the high Cariboo plateau, boring its way by a grisly trench through the Coast Mountains, and flowing calmly through the lower Fraser Valley. The river drains a total area of aproximately 88,700 square miles. This is nearly one-quarter of the total area of the Province.

The Lower Fraser Valley has a population of about 100,000 people engaged in intensive dairying, small-fruit farming, and market-gardening. It is the richest agricultural area of its size in British Columbia and possibly in Canada. As the river rose and as dykes broke in various places, about 75,000 acres were flooded, and all land communication between the Coast and the Interior was cut off. Railway lines were out of operation for nineteen days.

Much of this land was flooded in the great flood of 1894, but owing to the increase in population and the longer period in which the river was in flood, the flood of 1948 was the worst in the recorded history of British Columbia.

B.C. Flood Control Committee

On Friday, May 28, 1948, a state of emergency was declared by the Provincial Government, and, at the request of the Attorney-General, the Area Commander of the Canadian Army was asked to set up a flood-control committee to advise and assist all phases of the flood-control operations in the Lower Fraser Valley. The Committee had to do with the securing of voluntary manpower, machinery, and material to strengthen remaining dykes, evacuate families and live-stock from flooded areas, and arrange for the care of evacuees and for the protection of the public health. It was also responsible for the co-ordination

of the work, not only in the Lower Fraser Valley, but also in the other areas of the Province where flood problems existed.

Office space for the Committee was provided in the Provincial headquarters of the Canadian Red Cross. The chairman of the Provincial Red Cross Disaster and Relief Committee was named chairman of the B.C. Flood Control Committee, which included representatives from the Red Cross, the Canadian Army, the Royal Canadian Navy, the Royal Canadian Air Force, the British Columbia Police, the City of Vancouver, the Vancouver Board of Trade, and the Provincial Departments of Public Works, Agriculture, and Public Health. Dr. G. R. F. Elliot was appointed by the Deputy Minister to serve as his representative on the B.C. Flood Control Committee. The Committee was very active between May 28th and July 28th. Numerous meetings were held, and while the work was strenuous, the importance of such a committee in co-ordinating all activities in the time of any emergency was clearly demonstrated.

Available Public Health Personnel

The District Medical Officer, Canadian Army, and the Senior Medical Health Officer, City of Vancouver, worked in close co-operation with the Provincial representative on the Flood Control Committee. These officials alternated as health representatives at the meetings of the B.C. Flood Control Committee in order to permit more time to be spent in the flooded area.

It was indeed fortunate that the Health Branch of the Department of Health and Welfare had some one hundred public health nurses, ten sanitary inspectors, two nutritionists, a public health engineer, qualified public health physicians, and two public health educators who were available in various parts of the Province and who could be moved at the direction of the Deputy Minister of Health. In addition, the District Medical Officer, Canadian Army, had his Command Hygiene Officer flown in from the East to assist, and also made available his staff of sanitary inspectors. The Senior Medical Health Officer, City of Vancouver, made available the services of his staff of sanitary inspectors. Two of these sanitary inspectors served in the Fraser Valley flooded area for the entire duration of the emergency. The Department of National Health and Welfare placed three public health engineers and one epidemiologist at the disposal of the Provincial Health Department.

The Division of Laboratories, Provincial Department of Health and Welfare, was called upon to extend its services to the utmost, not only in handling the heavy increase in water-sample examinations, but also in assuring that adequate supplies of typhoid vaccine were received from Eastern Canada, and in arranging for its distribution.

Because of its location in Vancouver, the Central Office of the Provincial Health Department's Division of Venereal Disease Control was used as headquarters. The staff of this Division undertook all the necessary clerical work.

The work of the public health services fell into two main sections: (1) the flooding stage ("Operation Overflow"), and (2) the post-flooding stage ("Operation Clean-up").

"Operation Overflow"

It was decided from the beginning that if the work of the Health Department was to be effective, it must be done through the local part-time medical health officers in the Fraser Valley, who were thoroughly familiar with the people and the area. In every instance, therefore, the local health officers continued to be the local health authorities in their designated areas. Immediately after the organization of the B.C. Flood Control Committee, in each locality meetings were held, attended by the local medical health officer, local public health nurses and the Provincial Director of Public Health Nursing, the Provincial Director of Environmental Sanitation, and the Provincial Health Department representative on the B.C. Flood Control Committee. At these meetings the local program was planned. Included in these discussions were such problems as the need for additional physicians, public health nurses, sanitary inspectors, public health engineers, and other public health workers, and plans for action in case of possible isolation of areas due to the breaking of dykes. It was emphasized that the main function of the Provincial Health Department was to render all assistance possible, to supply additional public health personnel, and to provide technical advice and direction, when indicated or requested, to the local health services.

At the same time that organization was being undertaken in the field, it was also being developed in the central office in Vancouver. Firms handling chlorine products were contacted, and arrangements were made to "freeze" sufficient quantities to ensure an adequate supply at all times. Inventories were obtained of materials available in the Province which might be required. These included D.D.T. compounds and hypodermic syringes and needles. The Division of Laboratories made provision for an adequate supply of typhoid vaccine, and the Division of Public Health Education arranged for press releases concerning public health problems which might arise as a result of the flood.

In a matter of thirty-six hours from the time of the declaration by the Attorney-General of the state of emergency and the formation of the B.C. Flood Control Committee, public health personnel in the Fraser Valley had been increased from the basic staff of twenty-one public health nurses to thirty-one public health nurses, seven sanitary inspectors, four public health engineers, and four qualified public health physicians. These individuals were located in the local health service office while two sub-offices similar to the divisional headquarters in the armed forces were set up.

The work of the public health nurses was outstanding, in co-ordinating all activities related to general health. Because of their intimate knowledge of their own districts the public health nurses were able to offer direction in plans for evacuating residents, arranging for living quarters, feeding workers and evacuees; they assisted with transportation, generally fitting in where most needed to meet the emergency, using their public health training as opportunities arose. In one instance the public health nurse remained behind with the residents unable to flee flood waters, and provided the only nursing or medical care available for a maternity case and other patients.

Public health nurses did yeomen service in assisting to set up first-aid posts at the dykes and in Red Cross evacuee camps, and in supervising general health conditions within these centres. In many areas they arranged with the local nursing chapters for volunteer nurses to assist at Red Cross evacuee centres, and clinics. As evacuees became settled in centres, the public health nurses organized immunization clinics for protection against typhoid, heading up local publicity campaigns to inform the public of the need for immunization, as well as the time and place of the clinics which were held throughout the Fraser Valley to suit the convenience of the public.

Water Supply

Several days before the setting-up of the B.C. Flood Control Committee, the Director of Public Health Engineering and the Director of Public Health Nursing met with all the public health nurses in the Fraser Valley and briefed them on general sanitation in floods, including the treatment of water supplies. In the flooded areas of the Fraser Valley there were four municipal water supplies, which served about 50 per cent of the population. The remainder of the residents received their water from wells of various types. The public health nurses were provided with instructions for chlorinating the water and supplied with halazone tablets to be given to those whose water supplies were likely to be contaminated. These tablets had the disadvantage of being slow to dissolve and later chlorination of small quantities of water was done by using laundry bleach (sodium hypochlorite).

Of the four municipal water supplies, two were endangered early when the flood waters covered part of their mains. In both instances the systems were old, and the danger of seepage into the mains was great. Bacteriological examination of samples of water from these distribution systems did show that contamination in the main was increasing, even though the water supply was under pressure. In no instance was the actual water intake affected. This is due to the fact that in British Columbia most water intakes are located at high elevations. Where pumps are necessary these have all been installed above the 1894 flood stages.

To overcome the hazard in these two systems, emergency hypochlorinators using sodium hypochlorite were installed at Mission and in two places at Matsqui. These emergency chlorinators were effective in restoring the bacteriological quality of the water to normal. The other two municipal supplies were never seriously threatened, so that no emergency treatment was necessary.

The sanitary inspectors supervised the sanitary control of the camps for evacuees and dyke-workers. A further responsibility delegated to the sanitary inspectors was the assurance of a safe water supply for the men working on the dykes.

Typhoid Immunization

Plans for immunization clinics were made early in the flood. It was decided that T.A.B. vaccine would be used in preference to T.A.B.T. to obtain immunity more rapidly. It was recommended that children under the age of one

year should not be immunized unless there were definite evidence of exposure. All others were given a dosage of one-quarter c.c., one half c.c. and one c.c. at five- to seven-day intervals, with the exception of those over the age of 60 and under the age of 3, who received one-tenth c.c., one-quarter c.c., and one-half c.c. at the same intervals. It was planned at first that only those who were not engaged in manual labour on the dykes should be immunized, but this restriction was not possible as the public demand was all-inclusive and far exceeded the greatest expectations. Some 35,000 persons in the lower Fraser Valley were immunized. When one considers that many of the residents of the valley were using safe water and were in no way directly affected by the flood, it is reasonable to assume that most of those requiring protection received it. Many interesting incidents occurred during this immunization campaign. Public health nurses often proceeded in rowboats to immunize those individuals, few in number, who had refused to leave their homes although surrounded by water.

Milk and Food Supply

Many cattle were displaced and had to be milked under unsatisfactory conditions, without the aid of proper facilities for cooling and handling milk. Most of this milk was processed in Vancouver or in near-by cities in the Fraser Valley, so that the residents continued to obtain their supply of pasteurized milk. The majority of persons handling milk under adverse conditions used much greater than normal care, with the result that even although there were changes in the normal procedure there was no outbreak of milk-borne diseases.

Food continued to be distributed in the normal manner in most instances and in addition many isolated individuals were supplied by naval transport or aircraft. The nutritionists on the staff of the Provincial Health Department gave consultant service to public health nurses and sanitary inspectors in relation to mass feeding problems. This service entailed visits to evacuation camps and feeding centres for volunteer workers. Assistance was given in relation to problems of menu planning, equipment, emergency food storage and preservation of quantities of salvaged meat. In addition, the nutritionists worked directly with the local food control committee in an area where there was grave danger of isolation of some 10,000 people. The nutritionists prepared a detailed plan for serving emergency rations to this community. This plan was utilized by the committee as the basis for requisitioning and assembling food supplies and equipment.

Publicity

Throughout "Operation Overflow" a constant flow of news releases and radio flashes was maintained to inform the people of health problems and to prepare for problems which might arise. In addition, information was provided to give the general public an accurate account of the work under way. In many instances news releases were prepared by the Provincial Division of Public Health Education, and in others they were written by the local staff.

In some instances the local sanitary inspectors used the local radio-stations to advise the people of proper methods of handling sanitation problems. Warn-

ing posters were placed in all strategic places informing the public concerning the proper person to contact regarding public health matters.

Mosquito Control

The Fraser Valley is a natural habitat of mosquitoes, and although no disease has ever been traced to this insect in the area, it was realized early that they would become a problem. The responsibility for control of mosquitoes was accepted by the B.C. Flood Control Committee on humanitarian grounds and placed under the direct supervision of the Health Section. The actual work was done by a commercial firm, which had on its staff a highly trained group of recent university graduates, using conventional aircraft, a helicopter, blowers, and orchard-spraying equipment. Much of the spraying on the dykes was done by labourers appointed by the local Flood Control Committee. Five and ten per cent D.D.T. dust, and 50 per cent wettable D.D.T. and oil were used. The spraying treatment of such a vast area of agricultural land was undertaken with some trepidation, as various reports have been written concerning the harm to beneficial insects that has resulted from similar undertakings. In this operation, however, commendations were received from all. To date there have been no adverse reports.

"Operation Clean-up"

No definite line of demarcation occurred between "Operation Overflow" and "Operation Clean-Up". In the upper regions of the flooded areas, "Operation Clean-Up" was under way when "Operation Overflow" was still in progress in the lower regions. This, however, was the period when the sanitary inspectors and public health engineers lost all track of time, and their duties and responsibilities were heavy. Comprehensive instructions concerning the cleaning up of flooded homes and furniture, dairies, public buildings, milk houses, pasteurizing plants, cold-storage plants, and wells were prepared by the Division of Environmental Sanitation. These were widely circulated and were also posted at all strategic points. The press and radio were utilized at frequent intervals to give publicity to these instructions, and many large signs were put up in the flooded areas stating where information and supplies for clean-up procedures might be obtained.

Homes

Early in the flood the B.C. Flood Control Committee announced that homes could not be re-occupied until they had been approved by the health authorities as fit for habitation. Since the militia was in control, these instructions were issued in the name of the Army Commander, and they were obeyed willingly far better than even the most optimistic had dared to hope. In most areas, information and supply centres were established. The Department of Health supplied chloride of lime and other chlorine products to householders. These supplies were for the most part donated through the generosity of firms selling these chemicals in British Columbia. Chlorine in solution form, mainly laundry bleach (sodium hylochlorite) containing 5 per cent available chlorine,

was generally used to treat wells. For sandpoint (about 75 per cent of wells were sandpoints) one or two pints of 5 per cent available chlorine (sodium hylochlorite) were used. For dug wells, sufficient was used to give a chlorine residual of 50 P.P.M. Powdered chloride of lime was also used extensively in disinfecting septic tanks, privies, and yards. Stress was laid on the value of turning over the soil in yards in order to allow for greater exposure to the sun and air.

A form, Certificate of Health Inspection, was prepared, and every householder was required to have this signed by the local health officer or sanitary inspector before re-occupancy of the home was allowed. Adults were allowed to return to their homes during the day to carry out clean-up procedures. This meant that provision had to be made for the care of their young children, and at the suggestion of the Health Department, the Red Cross established day-nurseries for the purpose.

The work of the residents in preparing their homes for occupancy was largely hard, manual labour. Liberal quantities of disinfectants, especially the chlorine-bearing compounds, were used. High-pressure steam supplied by boilers mounted on trucks or trailers was found to be an efficient agent in some areas.

When issuing the final certificate that a house was habitable, the authorities stressed the fact that the certification did not include consideration of possible structural or electrical defects (this was printed on the forms). Certificates were not issued in cases where such defects were obvious, however. Some 1,500 houses were inspected and certified by the staff of sanitary inspectors.

Water Supply

The work here continued as in "Operation Overflow". The municipal water supply that had been shut down when the area was flooded was closely checked as the water receded, super-chlorinated, flushed out, and put into operation with the use of an emergency hypochlorinator. In all, three emergency chlorination plants were put into operation. These were maintained in use until the bacteriological quality of the water in the mains had returned to normal.

As mentioned previously, instructions concerning the sterilization of wells were issued and the necessary chemicals were applied. To prevent too great a load on the Provincial Laboratory, frequent sampling was discouraged. A test was not made on any well showing evidence of gross contamination. Nor was a test made on any well before proper cleansing procedure had been performed. In many cases it was found that contaminated wells, because of poor location or improper construction, had probably been in a contaminated condition prior to the flood and would continue in this poor state indefinitely unless the owners made the necessary improvements. Attempts were always made to have the owners rectify such defects.

In all, 439 wells were examined and 797 samples of water were taken. Only 18 per cent of the sandpoint wells sampled showed evidence of bacterial con-

tamination. In the case of dug wells, only those that had had a satisfactory sanitary survey were sampled. Of these, only 50 per cent showed freedom from contamination on the first sampling.

Food Stores

Grocery stores in particular presented many problems, due to the fact that although home-owners realized that compensation would be forthcoming, there was little likelihood of commercial organizations receiving compensation for losses. Food products in all except water-tight containers were already destroyed by the flood-waters. Canned foods presented a special problem. It was considered at first that canned goods could be used after merely immersing the cans in a chlorine solution, but the sanitary inspectors soon discovered that cans that had been under water for several days showed evidence of spoilage. As a result, a good deal of diplomacy was needed in persuading merchants that goods which in many instances were the last remnants of their stock, and which to the eyes seemed satisfactory, must be destroyed. However, the policy of destroying canned goods was carried out in all cases. All bottled goods, such as soft drinks, were destroyed regardless of the length of time of immersion, as it was considered, and later proved, that capping methods commonly in use gave little protection against contamination. Much of the contamination of both cans and metal caps of glass bottles was caused by corrosion of the metal followed by entry of bacteria into the contents.

Cold-Storage Locker Plants

There are numerous cold-storage locker plants throughout the Valley, but in only two instances were these plants affected. In one of these cases the cold-storage locker plant was deprived of electrical energy for two days. However, the plant was closed so that no doors into the cold-storage section were open, and the plant maintained its refrigeration temperature for the two days.

In the other case it was impossible to empty the contents of the plant before the flood-waters became too high. Seven tons of meat remained in the plant. Water covered about half of the lockers in the plant for three or four weeks. It was then exposed to the heat and flies for some weeks, and as a result the condition of this plant when the waters finally receded was indescribable. The odour was so intense that it was only with great difficulty that men were able to enter the plant to commence clean-up operations. Even with the use of gas-masks, a man could only stay in the plant for a short period of time. Also, the plant was alive with maggots and flies.

All the lockers were torn out and the lumber destroyed. In addition, the lining of the plant was taken out and the insulation dried. This plant is now in operation again.

Pasteurizing Plants

Several of these plants were affected, but, due mainly to their normal experiences in sterilizing equipment, no serious difficulties were encountered in cleaning them.

Sewage Disposal

There were no municipal sewage disposal works involved in the flood, as the greater part of the affected area used either septic tanks or privies. The privies were all problems. In some instances the septic tanks were completely destroyed, and therefore eliminated as problems. The privies were liberally treated with chloride of lime or covered in, as the individual case warranted.

Dead Animals

Only a few dead animals were found as the water receded, and these all presented individual problems. In some instances it was possible to bury the animals on the spot. Early in the flood, Flamethrowers were used, and while the Army was still in the area this method was continued and proved most satisfactory.

Garbage Disposal

The only problem that came to the attention of the Health Department regarding garbage was during "Operation Overflow" when certain individuals refused to leave their homes. As there were less than twenty such families in the whole area, this did not present any real difficulty, as in most cases the swollen waters of the Fraser River quickly carried garbage away. During "Operation Clean-up" garbage was easily disposed of through normal channels and by the use of emergency garbage-disposal dumps.

Barns and Milk-Houses

No unusual problem was presented here, as the usual recommendations requiring hard manual labour, followed by the use of chlorine products, were successful. In the cleaning of barns, the use of a solution of sodium or calcium hypochlorite applied by a steam spray was very successful.

Public Buildings and Schools

No particular problems were encountered regarding public buildings. Some schools were damaged by flooding, but the same clean-up procedures were used as for homes. Several community halls and roller-skating rinks were damaged structurally and were not re-opened for many months following the flood.

Summary

This paper has reviewed some of the problems which face a health department during a major flood emergency. Based on the experience in British Columbia, the following statements and conclusions are given in summary:

1. The importance of the Provincial Health Department's having direct control of public health services was made clearly evident. Only through such control and flexibility can sufficient numbers of public health personnel be placed quickly in the stricken areas.
2. The value of immediately seeking the assistance of senior government agencies, including the Department of National Health and Welfare and the medical branch of the Department of National Defence, was also

evident. Without such aid, much of the success of this work would not have been possible.

3. As soon as the possibility of a flood emergency became apparent, the Health Department prepared plans with respect to headquarters, personnel, channels of communication, and general policy.
4. During the emergency directives were sent to all concerned at frequent intervals.
5. Senior officials in direct charge of the different aspects of flood-control spent much time in the field.
6. The labour-load of the public health nurses was found to be greatest during the early stages of the emergency because of the volume of work concerning typhoid immunization, while that of the sanitary inspectors and public health engineers increased as the flood-waters receded.
7. Chlorine-bearing compounds were found to be the sterilizing chemicals of choice.
8. Effective co-operation with the health department was displayed by the general public during the emergency.
9. The success of measures to control disease depended upon the hard work and long hours put in by medical health officers, public health engineers, public health nurses, and sanitary inspectors in the field.
10. As a result of the efforts of all agencies and persons concerned, there was not a single case of typhoid fever or any other type of flood-borne illness.

The Present Status of Dental Preventive Measures

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THIS paper will deal with the status of measures directed at the prevention of caries, making only passing reference to the prevention of dental malformations and periodontal disease. Caries is the earliest and the major dental hazard of childhood. About 99 per cent of children in the 14-year age group, living in areas where no fluorine occurs naturally in the water supply, have a caries history.

A brief survey of the causes of dental caries will help in understanding the methods directed at its control. As in the case of most other diseases, these fall into two general categories: the direct and the indirect or, if you like, the immediate and the predisposing. For over fifty years acid action on the enamel has been suspected of being the direct cause. Conclusive evidence is now available (1) which shows that the initial lesion is due to lactic acid formed by the action of the acidogenic bacteria on carbohydrates—more specifically, the soluble carbohydrates. These provide the substrate from which certain acidogenic bacteria by enzymatic action form lactic acid within the bacterial plaques around the tooth, causing dissolution of the enamel. This opens the way for the action of proteolytic bacteria upon the organic portion of the dentine. There may be other immediate causes which have not yet been discovered. But certainly this is the major one.

Some of the known predisposing factors are: the composition and morphology of the tooth and its position in the arch; such properties of the saliva as buffering capacity, viscosity, organic content, quantity, anti-bacterial qualities; the nature of the diet, its physical properties and carbohydrate content.

Caries preventive measures now in use have three aims: (1) to decrease the rate of acid formation in the bacterial plaque around the tooth; (2) to decrease the acid-solubility of enamel; (3) to increase the rate of acid neutralization in the plaque.

Acid formation in plaque and food débris around the teeth depends upon the presence of acidogenic bacteria and a soluble carbohydrate substrate (2). A minute or two after the ingestion of sugar a hydrogen ion concentration below pH 5 can be demonstrated in plaque material in a caries-susceptible mouth. pH5 is the average dissolution point of enamel. A concentration of pH 4

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and lower is often reached and maintained for periods in excess of an hour, finally rising above the enamel dissolution point as the acidity of the plaque is buffered by the saliva. Obviously the frequency and duration of attacks of tooth decay can be governed by intelligent eating habits and properly planned oral hygiene. Brushing the teeth immediately after eating removes the carbohydrate substrate, reduces the bacterial count and raises the hydrogen ion content of the plaque above the critical pH 5. This can be demonstrated by potentiometer readings taken in dental plaques before and after ingesting sugar and before and after brushing the teeth following the ingestion of sugar. There is little hope of a toothbrushing program being effective in reducing the incidence of decay unless the cleansing is done with a view to interrupting the acid period that occurs in the dental plaque and débris just after eating.

A temporary reduction in the carbohydrate content of the diet without interference with nutritional needs is a very effective method to reduce caries activity. It is reflected in a marked drop in the oral lactobacillus count (3). This drop in count is so consistently associated with a decrease in carbohydrate intake and reduction in caries that it is in wide use as an index of caries activity. After a temporary reduction in sweets the average patient may return to their moderate use and retain his immunity for a matter of several months—or until his oral lactobacillus count rises to the caries level when it may be again reduced by decreased dietary carbohydrate. This is one proven, simple, practical caries preventive measure. Many State Department of Health laboratories in the United States do routine counts from salivary samples as a regular service to dentists practising preventive dentistry. There has been little action as yet in this field in Canada.

During recent years a great deal of interest has centered on the use of the fluorides to prevent dental caries. If a child can arrange to be born and brought up to the age of fourteen years in a place where the water supply contains from 1 to 1.5 p.p.m. of fluorine from a natural source, there is ample evidence that he has a good chance to have about 66 per cent less dental decay than he would have had in a district where no fluorine occurred naturally in the water. Recent examinations of over 1,300 children in Stratford, Ontario, have further corroborated this evidence. The fluorine has the effect of making the enamel less soluble in acid, and also inhibits the action of enzymes responsible for the degradation of sugar to lactic acid; apparently it also inhibits the growth of the oral lactobacillus.

Whether equally beneficial results can be obtained from the artificial fluorination of public water is not yet known. A carefully controlled experiment has been in progress in Brantford, Ontario, since June, 1945, but no full and conclusive evidence is expected until a statistically significant group of children born in Brantford since June, 1945, and in continuous residence there. have had time to calcify and erupt a set of permanent teeth. Their twelve-year molars will be erupted by 1957. However, it is possible that acceptable evidence may be available before that time. As yet we do not know.

Much experimental work (4) has been done on the topical application of fluoride solutions to the enamel of the teeth. Several compounds of

fluorine have been tried in different concentrations and in varying hydrogen ion concentrations, and by differing techniques. Much yet remains to be done where properly planned and controlled experiments can be set up. Out of all the work done in this field up to the present, one practicable and effective caries control measure has emerged. It has been shown by John Knutson (4) of the United States Public Health Service that a 2 per cent solution of sodium fluoride when applied to the teeth of children by a definite procedure will reduce the incidence of new decay by 40 per cent over a large group. All children will not benefit equally. Some will experience little or no reduction in new decay, while others will have a very great reduction. It is thought that among other things these differences are due to differences in sweets consumption and oral hygiene practices. Considering that only about 22 per cent of adult needs are met by ordinary treatment procedures—and a much smaller percentage of child needs—this figure of 40 per cent would seem to be of considerable importance. However, the procedure used is time-consuming and the dental profession was more than fully employed dealing with the results of dental disease before this new method was placed in its hands. Hence its wide application has not been possible. There are two urgent needs to be met before anything like the full benefits of the topical use of fluorides can be made available to all those in need of it; one is for further research aimed at shortening the time required for the technique of application, without loss of effectiveness; the second need is for a properly trained auxiliary dental group to handle it—and I emphasize the words *properly trained.*

Considerable experimental work (5) has been done on the use of fluorides in mouth-washes, dentrifices, and tablets for ingestion. There is no acceptable clinical evidence that any of these methods is effective.

Some interesting and perhaps promising research work (6) has been done, and is still in progress, on the use of certain urea compounds—chiefly carbamide and dibasic ammonium phosphate—to prevent caries. The bacteriological evidence appears to be good but, as yet, there is no acceptable clinical evidence that these compounds are effective. Such evidence should be available within a couple of years, from experiments now in progress in the United States.

Dentrifices containing penicillin have been shown to be effective in reducing the incidence of caries in rats and hamsters. When used in humans, immediate and marked reduction in oral lactobacillus counts occurred in nearly every case. Some penicillin-resistant strains were encountered. While the bacteriological evidence here is good, clinical evidence has not yet been obtained.

Some work has been done on the use of vitamin K (7) (2-methyl-1, 4-naphthoquinone) incorporated in chewing gum as a caries preventive. This substance is known to be an enzyme inhibitor, affecting the action of some of the enzymes responsible for the degradation of sugar to lactic acid. This method is thought to be theoretically sound—if perhaps not entirely practicable. However, no satisfactory clinical evidence is available to show that caries can be prevented in this way.

During the last two or three years, much publicity has been given to what is claimed to be a caries preventive measure; zinc chloride is placed upon the teeth and in carious areas and then precipitated by the use of potassium ferro-cyanide. It has been claimed that this procedure not only prevents decay but also arrests that which has already begun. However, the evidence which is available at this date is not regarded by most people in the caries research field as at all conclusive.

Nutrition deserves some comment when discussing caries preventive measures. It is of great importance in the formation of good tooth structure. There can be no doubt that poorly developed, hypoplastic enamel is more susceptible to acid action than that which is well formed. But once calcification of the enamel is complete it is not affected by nutritional factors, according to the best information available at present. The enamel of the 12-year molars is completely calcified by the ninth year in most cases. Any attempts to affect its composition by the use of vitamins, calcium, etc., after that time, are not likely to be of any use. However, the root portion and the dentine are susceptible to nutritional changes for some time—and possibly throughout life. But the enamel is the important part as far as decay is concerned. After the eruption of the teeth the nature of the diet becomes a more important factor in this matter than nutrition. There is no evidence that any type of malnutrition can affect the enamel of an erupted tooth or render it more susceptible to decay.

I shall make no attempt in this paper to refer to all the alleged or hopeful dental preventive measures which are now receiving or will probably in the near future achieve some publicity. The public interest in preventive dentistry has provided a fertile field for people with active imaginations and varied interests.

The quest for caries preventive measures has led thus far to five that are sufficiently well founded to warrant their use in a public health program. They are: (1) Oral lactobacillus counts and such soluble carbohydrate restrictions and control as these counts, caries activity, and the nature of the diet indicate in the individual case. (2) The teaching of an oral hygiene régime based on the knowledge that a caries activity period occurs immediately after eating sweets. (3) The topical application of a 2 per cent solution of sodium fluoride to the teeth of children between the ages of three and fourteen, using the only technique which has been proven effective (that by Knutson). (4) Regular conservative dental treatment beginning at the age of three years. (Cavities are never too small to fill.) (5) A dental health educational program with the specific aims of informing the public upon the following points: (a) the intelligent use of sweets in the light of their relationship to dental caries; (b) personal oral hygiene practices aimed at neutralizing as soon after eating as possible the acid formed in dental plaques; (c) the use and limitations of topically applied fluorides; (d) the health and economic advantages of early regular treatment beginning at the age of three.

Dental health education no longer can be limited to the statement "see your dentist every six months". There are effective economical ways to prevent

and control dental disease. It is probable that research will reveal others in the near future. Only a well-informed public can make the best use of them.

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An International Educational Program in the Field of Health

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THE closing years of the war saw a wide interest in international matters among public health workers. The United Nations Relief and Rehabilitation Administration was one manifestation. In the summer of 1946 what was probably the most distinguished group of health workers ever assembled met in New York and drew up the constitution for the World Health Organization. As part of the widespread interest, the Surgeon-General of the Public Health Service established an Office of International Health Relations in the Service. At the close of the New York meeting an allocation was secured for an Educational Programs Branch, and I was assigned to that. It is a tremendously interesting work that has grown steadily.

The orginal allocation came from our Department of State which has had, since 1942, funds for what is called Scientific and Cultural Cooperation with the American Republics. To carry on this work the Department has the help of two dozen other agencies in our government, who manage the actual details. In public health in the present fiscal year we have awarded 27 fellowships, and before the books close on July 1 we may add three or four more. Some of these people are already in the United States; others will come this summer or fall. Most of them will go to schools of public health, taking the required courses, then electing work in their special fields. The physicians are in public health administration, nutrition, laboratory, venereal disease control, parasitology, etc. Five fellows are engineers, five are nurses. Three of the latter will take postgraduate work in nursing education and will teach in schools of nursing when they go back. We had our first dentist this year, the director of public health dentistry in Columbia. He had already taken the courses in public health in Mexico City, and spent a profitable four months in the United States visiting the Forsyth Dental Infirmary in Boston and various State divisions of dental health. One physician teaches diseases of the heart in the National University of Chile. We have just found a place for a young instructor in pathology.

From these lists you will gather that we restrict our lists to various phases of public health, to teachers in schools of medicine and of nursing. With limited

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funds, we believe that in this way we can make the greatest contribution to sound progress in these our sister republics.

What is our machinery? Last fall we announced through our embassies in the various countries that we were offering these training grants. Prospectuses were sent out, telling of the opportunities, the qualifications necessary, and the procedure. We now have received about 80 applications. Each has a photograph of the applicant, an account of his education, his experience, what he is doing now, what he wants to study in the United States, a statement from someone in his government that a place waits for him on his return. Transcripts of his college work, three letters of reference, his physical examination, and a report on his English, complete the papers. Sometimes there is a comment from a local committee. We especially appreciate letters from American health workers, or from nationals who have themselves had training in our country.

We make the selections ourselves. On what do we base them? A good knowledge of English is essential. Without that, otherwise good people are badly handicapped. After that, we try to evaluate the training and ability of the individual and the importance of the work which he is to do when he returns. With these points in mind, we go as far down our list of applicants as available funds will permit. If the individual, or his government, can pay part of the expenses of his trip or of his study, we are able to grant more fellowships.

Those whose English needs further study come to Washington early in August for a month of intensive work. The others come in September. We are arranging for the people entering schools of public health to have a fortnight before school with a local department of health, observing operations and organization. They tell us that this helps them greatly with their class work later. While they are studying at the universities we try to visit them twice during the year, in the fall and in the spring, to keep in touch with them and to help with any problems that have appeared. When schools close, we arrange summer schedules to suit their special interests.

A teacher in a medical school usually spends most of his year in a similar department in one of our schools of medicine, then visits other schools and clinics for two months at the end. Travel grants, for three or four months, are also given in special cases, usually for older, more experienced workers. Recently we enabled a physician connected with the new school of public health at Santa Fe, Argentina, to visit schools of public health, of public health nursing and of medical social work in the United States, to aid with the plans for his own school.

Late in 1946 the Philippine Rehabilitation Act authorized the Public Health Service to train up to one hundred Filipinos in the United States, "in public health methods and administration." They have been coming over at the rate of 25 a year, and have been doing very well. They study hard, make friends, and fill useful positions when they go back. One physician who made all "A's" at Michigan in the spring of 1948 now heads up the work for crippled children in the Islands. Malaria, tuberculosis or venereal disease control, maternal and child health, public health nursing, health education, public health engineering,

mental hygiene, industrial hygiene, parasitology and general public health administration have been other fields represented.

For over two years the Public Health Service has had a health division as part of the U.S. Mission in Greece. Last year four Greeks were sent here for postgraduate training in tuberculosis, nutrition and nursing. By fall all four will be back in Greece, taking over responsibilities there. A larger fellowship program appears now to be in the making.

More recently the Offices of Military Government in the U.S. Zone in Germany and in Austria have transferred funds to us and have sent to this country public health officers and medical educators for several months of observation of the latest developments in their fields. In all, 21 physicians have come, and the program is expected to continue next fall.

Last year the Smith-Mundt Act authorized the extension of this scientific and cultural cooperation to Europe, Asia and Africa, but the appropriation for this purpose has not yet been passed by the Congress. Our office requested a small number of fellowships for Canada, but what we shall be authorized to do is not yet clear.

In addition to the grants which we ourselves offer on behalf of the United States, we look after a substantial number of fellows for other governments and for U.N. and the World Health Organization. India, Siam, Syria and Turkey are among the countries whose representatives have asked us to arrange the programs and supervise the work of trainees in the medical sciences whom they send to the United States. Some go to schools of public health, some are in a clinical field, some have travel programs. People on other funds we are able to send to the Toronto School of Hygiene, and we do. We cannot do that with trainees on U.S. appropriations. A year ago three physicians went back to Syria from schools of public health in North America, one each from Harvard, Vanderbilt and Toronto. We believe that the slightly different, though similar, points of view they are bringing back to their country will be valuable.

Of the international organizations, nutritionists occasionally are sent to us from the United Nations, but we have a substantial number of fellows from the World Health Organization. There is a general discussion whether such an international agency should conduct its own training in a given country, or turn it over to the health service of the country itself. On this question, no broad decision has been reached. There are points on both sides. Our present arrangement with WHO provides that we handle for trainees programs with governmental offices—Federal, State and local—while WHO approaches universities, private hospitals and voluntary agencies directly. They seem also to be asking us to handle trainees with especially involved programs. This is natural, since we are closer to the resources of our country than they are. The Regional Office of WHO for the Americas is now in Washington, and our contact with their training office, about two miles away, is close and friendly. Dr. Robert Lambert of the Rockefeller Foundation is their training consultant. We are very busy just now with the summer field programs of some 35 of their fellows who have been attending schools of public health, and with their new people

just beginning to arrive from abroad. We have no financial aid from WHO for this work.

A great many foreign health workers come to Washington through other agencies, and receiving them for the Surgeon-General is a substantial part of our work. We are practically the Washington office for the trainees of the Rockefeller Foundation, and we arrange their local programs. It is a pleasure to broaden our horizons by meeting them.

So much for foreign health workers coming to the United States. How do we operate educationally abroad? In the first place, through our fellowships themselves. Decision on the groups abroad to whom fellowships will be open will, in the long run, exert a strong influence on the development of health work in those countries. We want to concentrate our training grants instead of scattering them merely to any interested persons who may apply. We are looking for future leaders. We consider that the medical health officer is the key to the future development of public health anywhere. Next to him comes the nursing or engineering leader, or the division heads in the medical specialties. In education the teacher of preclinical sciences in the medical school, of nursing arts in the school of nursing, is a key person. These are our priorities. Next, we are convinced that by preparing and supervising the best possible school and field programs for our fellows and for the fellows whom other agencies entrust to us, we are contributing to the next decade or two in public health abroad.

Secondly, the Public Health Service has two health missions abroad, with substantial staffs, in Liberia and in Greece. Each has a local educational program in which we assist to a greater or lesser degree. People in general recognize that, if health work in any country is to be put on a sound basis, workers of that country must be trained. The job can never be done by foreigners. But where should these local people be trained, many ask, in their own country or in the United States? The answer is, in both. The mass of people should be trained at home; leaders should have a chance in foreign study.

Thirdly, we have made a beginning of sending visiting lecturers abroad. With funds from the Department of State, the dean of the Minnesota School of Public Health visited the schools of public health in South America last year, as a guest lecturer. The professor of preventive medicine at Cornell is on a similar trip this year.

In the fourth place, we are aiding and stimulating the sending of our own citizens abroad for study. We have made application for our first fellowships under WHO, and are waiting to learn of the results. We hope that many more fellowships will be available next year. What are called Fulbright funds, from the sale of war surplus goods in some twenty foreign countries, can be used to help our health workers to study in those countries.

Such is our program at present. Our work has grown steadily. New avenues seem to be opening before us. It is evident that much needs to be done, and that people everywhere are realizing this. It is unwise to try to be definite in prophecy, but it is in order to speak of possible developments under Point Four, so called, you may remember, from its place in President Truman's inaugural address of last January. This called for giving help to underdeveloped

parts of the world. It is recognized that health should have a large place in any such work. There is active planning and discussion. The extent to which we shall work through WHO or shall help other countries directly has not yet been decided; possibly each method will have its place. But in every plan a large place is given to the training of health staff. Every country and every program needs more and better trained workers.

From time to time I have mentioned that our office sends students to Toronto, or arranges field programs for students from Toronto or receives Canadian visitors. These contacts should be increased greatly. I trust that you too are applying for fellowships from WHO, and I hope that some of the applicants will request training in the United States. Since the Pan American Bureau is now serving as the Regional Office for this hemisphere for WHO, Canada will in due course be represented on the regional committee. In addition to the WHO fellowship training program, there is a substantial regional program in the same field, in which you will presumably be included. Besides your old friend, the Rockefeller Foundation, we are now making a list of other private organizations offering fellowships open to Canadians. Mead Johnson is one, with its opportunities in pediatrics.

You in Canada are playing an increasing part as a receiving and training country. Your schools of public health are admitting a growing number of students from abroad, not only from other members of your Commonwealth but from other countries too. Visitors will be coming to observe such things as your system for medical care. Canada is today one of the few countries able to offer facilities for high-grade postgraduate medical education. Serious thought should be given to expanding those facilities wherever possible and receiving more and more foreign postgraduate students.

The United States, is is evident, recognizes the need and the opportunity of cooperating with many friendly countries in the training of public health workers. For this, our own office was set up and is growing steadily. We are looking forward to Canada's sharing increasingly in the same fine task.

A Survey of the Nutritive Value of Milk and Milk Products as Sold on the Montreal Markets[1]

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AND
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THE calcium content of milk in different Canadian centres has been studied and a variation of ± 20 per cent from the figures given in tables of food values (1) was noted. This investigation was initiated by Semmons and McHenry (2), and further work reported by Robinson, Hlynka, Herman and McArthur (3) confirmed the need for surveys in each locality.

In consequence of these findings a survey of the calcium content of milk sold on Montreal markets has been undertaken and expanded to include phosphorus tests, since this mineral might conceivably vary also.

Values were determined for milk variously treated and also for some milk products, e.g., buttermilk, chocolate dairy drink, milk curd, cottage cheese, and ice cream.

Methods

Forty gram aliquots of thoroughly mixed milk samples were weighed, and dried at 100°C. during 12 to 15 hours. The resulting residue was ashed in a muffle furnace for 15 hours at 500°C. and subsequently a filtrate was prepared which was tested for calcium by the A.O.A.C. procedure (4) and for phosphorus by the method of Fiske and Subbarow (5).

Similar filtrates were prepared by ashing 20 grams of curd, 20 grams of cottage cheese, and 40 grams of ice cream.

Each time a milk or milk product was to be tested, two samples were ashed; filtrates were prepared and then two tests were made on each filtrate, giving a total of four determinations for calcium and four for phosphorus.

Results were transposed to milligrams calcium, and phosphorus, per 100 grams of the food studied.

Results

Four large dairies were chosen for the analysis of milk as it is sold on Montreal markets. This milk was known to come from herds within a radius of sixty miles of Montreal.

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Pasteurized milk was chosen as the type most commonly sold to be tested at least once a month. Four pints, one from each dairy, were purchased at stores on the same morning when tests were to be done.

To study the effect of processing on milk and milk products, samples were obtained from two dairies at four different intervals. The foods tested for their calcium and phosphorus content were: raw milk, pasteurized milk, buttermilk, chocolate dairy drink, milk curd, cottage cheese, and ice cream.

The calcium content of the milks studied increased during the winter and decreased during the summer, as indicated in Table I. Dairies 1, 2, and 4 show

TABLE I

CALCIUM CONTENT OF PASTEURIZED MILK FROM FOUR DAIRIES IN MILLIGRAMS PER HUNDRED GRAMS OF MILK

Month	Dairy No. 1	Dairy No. 2	Dairy No. 3	Dairy No. 4	Average
July	110	111	114	112	112
August	111	112	116	111	112
September	110	109	115	110	111
October	112	112	120	109	113
November	113	111	122	111	114
December	114	112	124	112	115
January	113	111	126	109	115
February	114	113	127	115	117
March	113	112	125	115	116
Total Average	112	111	121	112	114

similar values for calcium content, averaging 112 mgms. per cent, which is a difference of 6 mgms. or 5 per cent from the average value stated in the Tables of Food Values (1). An average of 121 mgms. per cent for dairy 3 brings this milk within a range of 3 mgms. or 2.5 per cent. Why the milk from one dairy should be consistently higher in calcium has not been established. When an average of the four dairies included in this study is taken, a value of 114 mgms. per cent is obtained, which is a difference of only 4 mgms. or 2 per cent from that found in the tables.

A comparison with results of mineral determinations made on milk in other parts of the Dominion (2, 3) shows Montreal figures in close agreement with those presented for Ottawa, Ont., and Kentville, N.S. Toronto, Ont., values are definitely lower while those reported for Summerland, B.C., are the highest of all that are available.

TABLE II

PHOSPHORUS CONTENT OF PASTEURIZED MILK FROM FOUR DAIRIES IN MILLIGRAMS PER HUNDRED GRAMS OF MILK

Month	Dairy No. 1	Dairy No. 2	Dairy No. 3	Dairy No. 4	Average
July	86	86	87	86	86
August	86	86	86	86	86
September	94	88	88	89	90
October	88	88	89	86	88
November	90	86	90	89	89
December	88	87	89	88	88
January	88	87	89	88	88
February	86	87	88	87	87
March	88	87	88	88	88
Total Average	88	87	88	88	88

Between the four dairies studied and within any one dairy at different seasons of the year, no appreciable difference in the phosphorus content was found (Table II). Average figures for each dairy of 88 mgms., 87 mgms., 88 mgms., and 88 mgms. were found, giving a general average of 88 mgms. per cent. This is 5 mgms. or 6 per cent less than the 93 mgms. stated in the tables used in Canada (1).

Table III gives the results for raw, pasteurized and homogenized milks, chocolate dairy drink, buttermilk, curd and cottage cheese, and ice cream from two dairies. These tests were made at four different intervals and the value reported is a mean of sixteen determinations.

TABLE III

CALCIUM AND PHOSPHORUS CONTENTS OF MILK AND MILK PRODUCTS IN MILLIGRAMS PER HUNDRED GRAMS OF MILK

Product	*Calcium*	*Phosphorus*
Raw milk	112	89
Pasteurized milk	114	89
Homogenized milk	115	89
Chocolate drink	113	94
Buttermilk	117	93
Curd	47	106
Cottage cheese	62	140
Ice cream	164	134

Pasteurized and homogenized milks have been compared with raw to determine the effect, if any, of the physical treatment which these milks have undergone. From the literature available on the subject, no differentiation would be expected and results of general analysis confirm these previous studies. Calcium and phosphorus values of milk from the two dairies showed close correlation.

Investigators have studied the effect of heat on milk with the view of determining if mineral salts were precipitated, thus decreasing the expected values. Surprisingly this work shows that the treated milks contain slightly larger amounts of calcium and phosphorus than raw milk.

Chocolate drink was found to contain slightly smaller amounts of calcium than milk, but had larger amounts of phosphorus. Values given for this study are slightly higher than those set forth in the Tables of Food Values (1) which show the mineral content of chocolate drink to be lower than that of whole milk.

The average figures for buttermilk from two dairies compare favourably and show a slight rise in calcium and phosphorus content over raw milk. Values found agree very closely with those given in Canada (1).

Since light cream is added to cottage cheese, larger amounts of calcium and phosphorus are expected to be found in this product than in curd. The results given in the tables confirm this. Although values found for cheese and curd from the two dairies were remarkably similar, figures for cottage cheese are much lower than those in the Tables of Food Values (1).

The mineral content of ice cream, although showing very little variation within one company, varied greatly from one company to another. This would

indicate that the mineral content of ice cream may vary according to the composition of the product as put forth by different companies. Inspection of Table III would indicate that ice cream is the richest source of calcium studied. This is true on the 100 grams basis, but taken on the basis of calcium content per serving we get a more realistic picture, as demonstrated in Table IV.

TABLE IV

Food	Weight of average serving	Calcium content mgm.	Phosphorus content mgm.
Milk	8 oz. or 240 gm.	274	213
Cottage Cheese	2½ tbsps. or 45 gm.	28	63
Ice Cream	1 scoop or 100 gm.	164	134

Summary

Determinations of the calcium and phosphorus content of fluid milks sold in Montreal were made at least once a month for nine months. The average values ranged from 109 to 127 mgms. per cent for calcium with a mean value of 114 mgms. and from 86 to 94 mgms. per cent for phosphorus with a mean of 88 mgms.

Pasteurization and homogenization showed no effect on the content of these minerals in fluid milk.

In an investigation on some milk products, chocolate dairy drink contained less calcium but more phosphorus than milk, while buttermilk had slightly greater amounts of calcium and phosphorus than raw milk. Milk curd was found to lose a large percentage of the calcium and phosphorus which were initially present in the milk. In cottage cheese, this loss is partially compensated for by the addition of a light cream. Ice cream proved to be a moderately good source of calcium but it was not as good as any of the fluid milks when considered on a per serving basis.

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An Outbreak of Salmonella Typhi Murium in Alberta

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DURING the last several years, it has been the custom of this Provincial Laboratory, when reporting the isolation of Salmonellae, to request a brief history regarding the source of infection, duration and type of illness, etc. This procedure has revealed numerous interesting cases. A small outbreak in which *S. typhi-murium* was the infecting organism is reported here.

On June 12th, a specimen of stool was received from Baby A. N. Routine culture revealed the presence of Salmonella typhi-murium. The reply to our request for a history was received from the physician in charge of the case on June 23rd and was in part as follows:

> "The baby of this family had a severe diarrhoea and stool culture was reported as *S. typhi-murium*. However, the first of the family to be affected was the mother, Mrs. N., who had a severe gastro-enteritis of about three days' duration and a gradual recovery over about a week. The baby was then infected and then the remainder of the family (father and four other children). They had an acute gastro-enteritis lasting about three days and followed by a full recovery without residual fever or symptoms. Clinically they were not typhoid. It was of interest to note that the diarrhoea on the N. farm commenced in the cattle and ran a a similar course except that several of the calves are still ill. Since the barn drains into their well, it was postulated that a typhoid-like colon bacillus may have been responsible.
>
> "A sample of well water and stool from one of the sick calves is forwarded for culture."

Also received were blood specimens from the mother and one of the children, M. N. The blood of the mother agglutinated the organism isolated originally from the baby to a dilution of 1/800. M. N.'s blood failed to agglutinate the organism in a 1/50 or higher dilution. Culture of the stool specimen from the calf revealed the presence of *S. typhi-murium*. The well water and milk received were of small amounts in improper containers so that a satisfactory examination could not be carried out.

Stool specimens from all members of the family were received on July 2nd. Those of both parents, M. N. and Baby A. all contained *S. typhi-murium;* the other specimens were negative.

Discussion

The laboratory findings given above are of interest in that an apparently identical organism was isolated from a human and an animal source. A possible connection between the two sources is suggested by the history. During the last year a number of Salmonella cultures have been submitted to us for final identification by the Provincial Veterinary Laboratory. These cultures have been isolated by them from animal and from poultry sources. A comparison between these types and those human types encountered during the same period shows a striking similarity.

Summary

An outbreak of *S. typhi-murium* affecting a family of seven residing on a farm is reported. An organism, apparently identical with the strain isolated from members of this family, was isolated from a calf on this farm.

Our thanks are due to Dr. C. H. Smith for the case history he kindly submitted.

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Q FEVER

WITHIN a decade since its recognition in Australia, Q fever has been recognized in the Mediterranean area, several countries in Europe, Central America, and the United States. Although it has not yet been reported in Canada, the possibility of its appearance must not be overlooked. Q fever, characterized by high fever, headache and malaise, was first described in 1937 by Derrick, who published a report relating to a disease which had been occurring in Australia since 1933 in a large abattoir in Brisbane. Burnet, in Australia, subsequently isolated rickettsial-like bodies which are now known to be the causative agent of the disease. He was able to isolate the infective agent and to grow it in developing chick embryo. In 1938 Davis and Cox, at the Rocky Mountain Laboratory of the United States Public Health Service, reported the isolation of a rickettsia obtained from ticks which had been collected several years before in Montana, where a disease designated "nine-mile fever" had been described. Intensive investigations were conducted at the National Institute of Health, Washington, as well as in the laboratory at Hamilton, Montana. In 1938, Dr. R. E. Dyer, now director of the National Institute, isolated a strain from one of the workers of the Institute who had been four days in the Montana laboratory. It was shortly established that the strain isolated by Burnet in Australia and the strain from Montana were closely related, if not identical. In recognition of the work of Cox and Burnet, and because the strain differs from typical rickettsiae, the genus has been named *Coxiella burnetii.*

The first epidemic occurring under natural conditions was reported in Amarillo, Texas, in 1946, among abattoir employees. There were 55 cases and 2 deaths. In August of that year a second outbreak was reported among packing-house workers in Chicago, and in the fall of the same year an endemic focus of Q fever was discovered in Los Angeles County, California. Huebner *et al.* published a study of 625 clinical cases occurring in different countries. The severity of the disease ranged from mild influenza-like attacks to grave illnesses. The onset was abrupt and associated with headache and general malaise, with respiratory symptoms. Physical findings referable to the respiratory tract were minimal, and evidence of pulmonary lesions was revealed, as in virus pneumonia.

by X-ray films of the chest. The average incubation period was from 16 to 18 days, with a minimum of 13 days and a maximum of 32 days. Fever and headache were recorded in almost all of the cases. The absence of abnormal changes in the upper respiratory tract assists in differentiating the illness from influenza and the common cold. Included in the study were more than 300 cases from Los Angeles County.

The mode of transmission of this disease is not clear. The early investigations established that ticks and other arthropods were related to its spread, but the occurrence of the disease among abattoir workers and other urban dwellers suggests that other avenues of transmission must exist. There is no evidence that infected persons are a source of human infections. The presence of *C. burnetii* in the raw milk supply in the Los Angeles area indicates that milk may be a factor. Experimental work has demonstrated that pasteurization destroys *C. burnetii* and that properly pasteurized milk is incapable of causing the infection. It has been suggested that the outbreaks among laboratory workers in the National Institute of Health were through the medium of contaminated air, by droplet infection, or by dust.

Q fever, producing an illness which resembles closely the picture of virus pneumonia, is a disease which must receive more study. Strauss and Sulkin, working in Texas, made a survey of the presence of antibodies with *C. burnetii* antigens in various geographic areas and occupational groups in the United States. In all, 5,470 sera were studied, obtained from persons in Massachusetts, Minnesota, Oregon and Texas. Indications were found in sera from all geographic areas studied, suggesting that Q fever may occur in low incidence throughout the country and that the southwestern part of the United States may have a higher incidence than other areas of the country. In Canada, no Dominion-wide survey has been attempted, since no cases have been described as yet.

NEWS

British Columbia

CERTAIN MEMBERS of the senior staff of the Provincial Department of Health are attending various universities during the current scholastic year to work towards graduate degrees in the field of public health. Mr. C. R. Stonehouse, the senior sanitarian with the department, has gone to the University of California and there takes a four months' course in advanced sanitation. Mr. Norman Goode, assistant public health engineer, has been sent to Johns Hopkins University, Baltimore, for post-graduate training in public health engineering. Miss Lucille Giovando, public health nurse, is attending the University of Minnesota and will work towards a Master's degree in public health nursing administration with special reference to mental health. Dr. F. McCombie, recently appointed acting director of the new Division of Preventive Dentistry, is studying for his Diploma in Dental Public Health at the University of Toronto. Miss Joan List, who is with the Division of Health Education, is attending the University of North Carolina to take courses leading to the degree of Master of Public Health in the field of health education. These opportunities for advanced training were made available by the Dominion Government through the National Health grants.

IN AUGUST the senior public health nurses of the province attended a two-weeks' advanced course in nursing supervision, conducted by Miss Marion Murphy, R.N., M.P.H., associate professor of public health nursing at the University of Michigan. This course was arranged by Miss Murphy with the cooperation of Miss Monica Frith, R.N., B.A., B.A.Sc., M.P.H., director of public health nursing in British Columbia. This is another of the projects made possible by Federal grants.

SANITARY INSPECTORS throughout the Province met in Vancouver to discuss their problems at the Sanitary Inspectors' Conference, held on July 27th to 29th. Every phase of British Columbia's sanitation program was discussed, with various members of the Provincial Health Department, the Metropolitan Health Committee for Greater Vancouver, and the Greater Victoria and Esquimalt Health Department acting as chairmen and discussion leaders. Guest speakers from other departments were Mr. Mr. J. H. Doughty-Davies, director of the Regional Planning Division for British Columbia, and Dr. W. R. Gunn, live-stock commissioner and chief veterinary inspector, Department of Agriculture.

DURING THE WEEK OF AUGUST 1ST-6TH, the first Institute on Environmental Sanitation was conducted in Vancouver, under the supervision of Professor Walter S. Mangold, associate professor of public health, School of Public Health, University of California, and Mr. A. H. Bliss, acting chairman, Department of Public Health, Los Angeles Campus, University of California. The purpose of the Institute was to enlarge the understanding of the role of the sanitarian and of the principles of sanitary science; to enable those attending to read the literature with a understanding mind; to explain by procedures; to foster the development of a public-relations attitude; to acquaint sanitarians with other official and non-official public health groups, so that they might learn how their work fits into the programs of such groups; and to teach the control of communicable disease through a knowledge of the etiology of each disease concerned. A written examination on the basic content of the course was reviewed and discussed. Subjects included were: the role of the sanitarian; milk and food as vehicles of disease; interpretation of laboratory tests; public health administration; food poisoning and its relationship to inspection; protection and purification of water supplies; the disposal of sewage and excreta; relationship of the sanitarian to other public health activities; housing and the local health; physical aspects of housing; public relations; principles of meat inspection; rodent control and sylvatic plague survey; growth of re-

sponsibility of the sanitarian; swimming pool sanitation; and disinfection and disinfectants.

Alberta

MR. JOHN H. BROWN, public health entomologist, represented the Alberta Department of Public Health at the fourth International Conference on Diseases of Nature Communicable to Man, held at the University of California, Berkeley, August 23rd to 27th. Over 200 delegates representing public health institutions in western North America were present. The subjects discussed were: rodent reservoirs of disease, Q fever, rabies lymphocytic choriomeningitis, leptospirosis, tularaemia, plague, brucellosis, toxoplasmosis, rat-bite fever, psittacosis, fungus diseases, Salmonellosis, Newcastle disease, arthropod vectors of disease, encephalitides, Rocky Mountain spotted fever, relapsing fever, tick-bite fever and myxomatosis. The discussion on plague indicated that it is a disease of serious international importance and that it is cyclic in occurrence, with every indication of building up to epidemic proportions. Dr. K. F. Meyer, director of the Hooper Foundation, University of California, was elected president for 1950; Mr. J. H. Brown was elected vice-president, and Dr. W. R. Geidt, Washington State Board of Health, was elected secretary. The 1950 meeting will be held at the Universty of Washington School of Medicine, Seattle.

Public Health Nursing Division

MISS MARGUERITE M. FITZSIMMONS, who recently returned to Alberta after completing a course in public health administration and supervision at the University of Toronto, has been appointed assistant director of public health nursing in Alberta.

MISS MARIE THERESE LEFEBVRE, a graduate of the Misericordia Hospital, Edmonton, has joined the staff of the Division and is stationed at Valley View.

MRS. WILMA GUNN, a graduate of the Provincial Mental Hospital, Ponoka, joined the staff on June 29th, to fill the vacancy at Sunnynook.

MISS NELLIE BEATSON, a graduate of the Royal Infirmary, Sheffield, England, was appointed to the staff on August 15th and is stationed at Lindale.

MISS BETH HELLER, B.Sc., a graduate of the University of Alberta Hospital, has been appointed to the Spirit River One-nurse Health Unit to succeed Mrs. Camilla Hudson, who resigned recently.

MISS ELAINE CORNISH, a graduate of the Montreal General Hospital, joined the staff on August 29th and is stationed at Bonanza.

MISS D. VERA GRIFFITHS, a graduate of Galt Hospital, Lethbridge, has joined the staff of the Wheatland One-nurse Health Unit at Strathmore.

MISS WILMA DOYLE resigned from the district of Maloy on July 5th, to join the foreign missionary service.

MISS DULCIA WILLIAMS, of Grassland, resigned on July 31st, to be married.

MRS. E. A. BENNETT of Vauxhall has been transferred to the district of Whitemud Creek. Her position has been taken by Miss Edna Carveth.

LEAVES OF ABSENCE have been granted to the following so that they may take public health courses: Miss Sarah MacIntyre and Miss Lucille Laferriere, who will attend the University of Alberta, and Mrs. C. J. Somerville, who will attend the University of Toronto.

MISS JEANETTE MCINNIS has returned to staff duty after an absence of two years and is stationed in New Brigden.

MISS M. E. HAGERMAN AND MISS M. K. ANDERSON have returned to Alberta after attending the International Congress of Nurses in Stockholm.

Division of Sanitary Engineering

MR. JAMES E. HOSKINS, C.S.I. (C.), joined the staff of the Division as a sanitary inspector on July 23rd. He will have his headquarters in Calgary and will work in the area surrounding that city.

THE ANNUAL REFRESHER COURSE IN SANITARY INSPECTION was held in the Arts Building, University of Alberta, from September 14th to 17th, immediately following the annual meeting of the Alberta Public Health Association. The course was sponsored by the Sanitary Inspectors' Section of the Alberta Public Health Association in cooperation with the Faculty of Agriculture and the Department of Extension of the University of Alberta. The chairman was Mr. W. A. Milligan, Provincial plumbing and sanitary inspector,

who prepared a varied program which was of great interest and value to the sanitary inspectors.

Stettler Health Unit

DR. RAWLINSON, M.A., M.R.C.S., L.R.C.P., D.P.H., has arrived from London, England, to take over the duties of medical officer of health for the Stettler Health Unit. Miss Ries, Reg. N., has resigned her position with the Unit to take up district nursing in Alberta. Miss Vera Gines, Reg. N., has left the staff to take a position with the Edmonton Rural Health Unit. Miss Thelma McKenzie, of Stettler, will commence duty with the Stettler Health Unit in September. Miss McKenzie recently completed the work for the degree of B.Sc. in the University of Alberta.

Saskatchewan

DR. STANLEY C. BEST, a graduate of the University of Toronto, was appointed director of the Division of Communicable Diseases of the Provincial Department of Public Health on July 15. His duties will include the organization of a Division of Maternal and Child Health, of which he will be acting director.

OWING TO THE EXPANSION of the Division of Venereal Disease Control, a full-time director was appointed on July 11 in the person of Dr. A. V. Follett of Calgary, a graduate of the University of Alberta. Dr. Follett and Dr. C. R. Totton, medical health officer for the northern areas of the Province, recently completed a survey trip to the northern outposts of the Province in order to investigate the reported incidence of venereal diseases in those areas.

DR. A. E. CHEGWIN, director of the Division of Dental Health, has left for Toronto, where he will take the course leading to the Diploma in Dental Public Health at the School of Hygiene. He spent his vacation en route visiting dental public health officials in the United States. These included the State directors of Minnesota, Illinois, and Michigan, and several endowed clinics where treatment services are provided exclusively for children, viz., the Zoller Memorial Clinic in Chicago, the Eastman Clinic in Rochester, N.Y., and the W. K. Kellogg Foundation in Battle Creek, Michigan.

THE DIVISION OF HEALTH EDUCATION held a staff conference from July 25-29, at which the director of each division of the Department of Public Health spoke on the functions of his branch of the Service. The main purpose of this conference was to orientate the new members of the Health Education staff.

A HOME AND SCHOOL INSTITUTE, sponsored by the Saskatchewan Federation of Home and School and the Divisions of Health Education, Mental Services, and Adult Education, was held at the Qu' Appelle Valley Centre, Fort Qu'Appelle, from August 8-12. Public health personnel in attendance were: Mr. James D. Ward, acting director, and Miss Rowena B.O. Hawkings, publicist, Division of Health Education; Miss Janet Buck, senior psychologist, Mr. Fred MacKinnon, teacher-psychologist, and Mr. Neil Agnew, supervisor of recreational and social therapy at the Saskatchewan Hospital in Weyburn, from the Division of Mental Services.

Manitoba

TWO OF MANITOBA'S HEALTH UNITS have been enlarged to include new territories. Forty Garry, a suburb of Winnipeg, was incorporated on July 1 into the St. James—St. Vital Health Unit, bringing the number of people served to 37,000. This is the largest unit in Manitoba and serves three Winnipeg suburbs. Dr. Noel Rawson is the director and there are six nurses, two sanitary inspectors, and three office assistants. Miss B. Warbanski, a fully trained public health nurse, has been stationed in Fort Garry.

THE MUNICIPALITY AND VILLAGE OF GILBERT PLAINS on August 1 joined the Dauphin Health Unit and added 5,000 people to the number served by that unit under Dr. R. M. Creighton. A new nurse, Miss D. Russenel, has been added to the staff. Gilbert Plains also was added to the Dauphin Diagnostic Unit.

DR. VICTOR SADLER HAWKES, M.R.C.S., L.R.C.P., and Dr. Ernest Mastromatteo have been granted leave of absence from their health units in Manitoba to take the course leading to the Diploma in Public Health at the School of Hygiene, University of Toronto. They are the first medical men from Manitoba to get training under

the professional training section of the Federal Health Grants. Dr. Hawkes, who came from England a few years ago, was appointed last March as medical health director of the Stonewall Health Unit, with headquarters at Stonewall. Dr. Mastromatteo took over the post of medical director of the Virden Health Unit in February. His headquarters are at Virden. He is a native of Toronto and graduated from the University of Toronto in 1947. He interned at St. Michael's Hospital, Toronto, and the Ottawa General Hospital before he came to Virden. Both men will return to their units next year.

DR. JOHN MUIR BROWN, M.B., Ch.B., D.P.H., came from London, England, to take the post of medical director of the Red River Health Unit. His headquarters are in the new wing of the hospital at Steinbach. Dr. Brown succeeds Dr. Ruth MacDougall, who has been appointed director of maternal and child welfare in New Brunswick. Dr. Brown is a native of Glasgow, Scotland, and graduated from the University there.

TWO MEMBERS of the Manitoba Department of Health and Public Welfare have resigned for posts in other provinces. Miss Olga H. Anderson, B.Sc., M.S.P.H., was with the Health Education Bureau for three years as nutrition consultant. She accepted the post of director of health education for the Province of Saskatchewan. Miss Anderson is a graduate of the University of Manitoba and the University of North Carolina. Dr. John Christopher Colbeck, B.S., M.R.C.S., L.R.C.P., is resigning as director of Manitoba's provincial laboratory to go to the Shaughnessy Hospital in Vancouver. Dr. Colbeck came to Manitoba from England a little over a year ago. He studied in London, Freiburg, and Cambridge, and during the war was head of an emergency public health laboratory in Kent.

DR. L. P. LANSDOWN has been named acting director of the Provincial Laboratories. He has been medical director of the Swan Valley Health Unit and has had considerable training and experience in bacteriology, having been in charge of this work in Canadian General Hospitals during the recent war.

FOUR NURSES from the Department of Health and Public Welfare attended the six-weeks' summer school at the University of Minnesota on public health nursing supervision. They are Josephine DeBrincat and Laura Johnson, both supervisors in the Division of Public Health Nursing; Mary Wilson, senior nurse of the Selkirk Health Unit; and Janet Smith, senior nurse of the Red River Health Unit.

Ontario

DR. MARTIN W. CHEPESUIK, a graduate of Queen's University in both Arts and Medicine, recently joined the staff of the Division of Industrial Hygiene of the Ontario Department of Health. Dr. Chepesuik also holds the Diploma in Public Health from the School of Hygiene, University of Toronto.

MR. ERNEST LEE, director of physical education and recreation for the Province of British Columbia since 1946, has been appointed national director of physical fitness in the Department of National Health and Welfare, Ottawa, and chairman of the National Council of Physical Fitness. Mr. Lee was a member of the Summer School of Education staff for nine years, from 1938 to 1947, and served as special lecturer at the University of British Columbia's Department of Education. He has been British Columbia's representative on the National Council of Physical Fitness for the last three years.

Maritimes

EIGHT MORE PERSONS from the Maritime Provinces have been awarded assistance to improve their training in various phases of medicine and public health. These include four from Nova Scotia, three from Prince Edward Island, and one from New Brunswick. A nurse from Nova Scotia will receive four months' special training in operating-room techniques at St. Michael's Hospital, Toronto, and a doctor will study the latest obstetrical practices for a year in the United States. Two university graduates will receive short courses in psychology, one at Sunnybrook Hospital, Toronto, and the other at Columbia University, New York.

Two doctors are among those from Prince Edward Island receiving awards. One is taking a two-year course in psychiatry at Dalhousie University, Halifax, and the other will enrol in public health at

the School of Hygiene, University of Toronto. Both are expected to join the staff of the provincial Department of Health and Welfare on completion of their training. The third Prince Edward Island award goes to a young woman for training in psychiatric social work at the Maritime School of Social Work, Halifax.

In New Brunswick aid is being given to a former teacher studying mental health guidance at Boston University.

BOOKS

Industrial Hygiene and Toxicology.

Prepared by a group of specialists under the editorship of Frank A. Patty. In two volumes, Volume I. New York: Interscience Publishers, Inc., 215 Fourth Avenue, 1949. London: Interscience Publishers Ltd. 531 pp. $10.00.

THIS TREATISE is presented under the editorship of Mr. Frank A. Patty, Director, Industrial Hygiene Service, General Motors Corporation, Detroit, who has been assisted by ten contributors as specialists in particular fields of industrial hygiene. The object of the book is to provide sufficient detail in industrial hygiene and toxicology to assist all persons interested in safeguarding the health and welfare of artisans and in improving the working environment. Five chapters of this exhaustive volume have been written by Mr. Patty and cover the historical aspects and present status of industrial hygiene in various countries in chapter I; the types of industrial hygiene surveys in chapter III, which lays stress on utilizing engineering methods of control for the prevention of industrial diseases; the mode of entry and action of toxic agents in the human body in chapter VII; practical methods of sampling and analysis of gases, vapours, dusts and fumes in chapter VIII; and a valuable discussion of types of respirators affording protection against various air contaminants in chapter XIV.

The personal factors in fatigue are discussed at length in chapter IV by Dr. Josef Brozek, while the importance of the environmental factors is stressed by W. N. Witheridge in chapters V and X, which include such topics as air conditioning, illumination, noise control and ventilation in its various theoretical and applied aspects.

The physiological effects of an increase and of a reduction in atmospheric pressure on the body are described in considerable detail in chapter VI by Heinz Specht. Procedures for avoiding decompression sickness in diving and caisson operations and in aeronautics are carefully explained and reveal an intimate acquaintance with the newer knowledge gained from researches conducted by Industrial Hygiene and Aviation Medicine Research Units during the War.

A very interesting chapter (IX) on Radiant Energy and Radium written by Dr. L. F. Curtiss explains the hazards which arise in industrial processes where radiation is present as gamma rays, x-rays, infra-red radiation, ultra-violet radiation and corpuscular radiation. Methods of protection from these types of radiation and methods for the detection of unsafe conditions in radium dial painting and in the thorium incandescent mantle industry are prescribed.

Dr. Louis Schwartz contributes a valuable chapter (XI) on occupational dermatoses, with a detailed description of the predisposing and exciting causes, the use of the patch test for determining the cause of contact dermatitis, and methods of investigating, controlling and preventing outbreaks in industrial plants.

In chapter XII, Dr. C. P. McCord writes an interesting account of the external signs of occupational diseases which should be noted by an acute observer and presents in a tabular list the common external marks of occupation appearing on the skin, eyes, nose, ears, lips, mouth, teeth and tongue and their differential diagnoses.

A highly technical chapter (XIII) on the explosion hazards of combustible gases, vapours and dusts is profusely illustrated with tables, diagrams and charts; while the last chapter (XV) entitled "Dust and its role in the causation of occupational disease" concludes this volume—a veritable compendium of useful and authoritative information of great value in preventive medicine.

The text of the book is printed on non-glossy paper which avoids reflective glare in artificial light. It is easily read and the contents of the chapters may be readily grasped by physicians without a detailed knowledge of physics, chemistry or engineering, or by industrial hygienists without medical training.

J. Wyllie.